

Name _____

291 Final Exam Review

The following is a review of chapters 6 - 11 for the final exam. Do all problems on a separate sheet of paper and SHOW YOUR WORK!! For more problems visit the extra practice sections in the back of your textbook.

A. Chapter 6:

Use the discriminant ($b^2 - 4ac$) to determine the nature of the roots.

1. $2x^2 - 4x + 3 = 0$

2. $b^2 - 7b + 5 = 0$

3. $5x^2 + 2x = 3$

4. Find k such that $x^2 - 5x + k = 0$ has two imaginary roots ($b^2 - 4ac < 0$)

Write a quadratic equation having the given solution set ($x^2 - (r_1 + r_2)x + r_1 \cdot r_2 = 0$)

5. $\{3 + i, 3 - i\}$

6. $\{-4, 3\}$

7. $\left\{\frac{3 \pm 2i}{2}\right\}$

Write a polynomial equation of smallest degree with integral coefficients having the given roots.

8. $2i, -3$

9. $\frac{1}{4}, \frac{3}{4}, 2$

10. Solve: $x^2 + 3x - 10 < 0$

B. Chapter 7:

1. Given $P(x) = x^4 - x^3 + x - 1$, find $P(3)$.

2. Use synthetic division $(x^5 + 8x^3 + 2) \div (x - 2)$.

3. Find all zeros of $x^3 - 10x^2 + 34x - 40 = 0$ if $3 + i$ is one zero.

4. Find all zeros of $x^3 - 3x^2 - 53x - 9 = 0$

5. Find all real roots using the calculator: $x^3 + 3x^2 - 2x + 1 = 0$.

6. Find the inverse of $f(x) = 3x - 4$.

C. Chapter 8:

Write the equation of the circle with the given the information.

1. $r = 5$; $C(-3, 4)$ 2. $r = \frac{2}{3}$; $C(3, 2)$ 3. Diameter endpoints: $(5, 2)$ $(-3, -2)$

For each ellipse, determine whether the major axis is horizontal or vertical.

4. $\frac{x^2}{16} + \frac{y^2}{49} = 1$

5. $x^2 + 9y^2 = 36$

6. $25x^2 + 16y^2 = 1600$

C. Chapter 8:

For each parabola, determine the vertex, focus, axis of symmetry, and directrix.

7. $y = (x+2)^2 - 7$

8. $y = x^2 - 3x + 5$

9. $x = y^2 - 3$

For each hyperbola, find the coordinates of the center, vertices, and foci.

10. $\frac{y^2}{49} - \frac{x^2}{4} = 1$

11. $\frac{x^2}{16} - \frac{y^2}{16} = 1$

12. $\frac{x^2}{1} - \frac{y^2}{4} = 1$

13. Solve the following system: $x^2 + y^2 = 100$; $y = 2 - x$

Write the equation for the given conic section with the given information.

14. Parabola; V(2, -3) and F(0, -3)

15. Ellipse; Endpoints of major axis (-2, 7) & (4, 7); Endpoints of minor axis (1, 5) & (1, 9)

16. Hyperbola; Vertices (-3, 0) & (3, 0); conjugate axis of length 8 units

D. Chapter 9:

Simplify.

1. $\frac{x^2 - 4}{4x^2 - 1} \cdot \frac{2x - 1}{x + 2}$

2. $\frac{x^2 - 1}{2x^2 - x - 1} \div \frac{x^2 - 4}{2x^2 - 3x - 2}$

3. $\frac{1}{x^2 - x} + \frac{1}{x^2 + x}$

Graph #s 5 and 6. List the holes and/or asymptotes.

4. $\frac{1}{x^2 - 1} - \frac{1}{(x - 1)^2}$

5. $f(x) = \frac{x^2 - 16}{x - 4}$

6. $f(x) = \frac{x^2 + 5x - 14}{x^2 + 9x + 14}$

**** IF TIME PERMITS?? 7. If m varies directly as w and m = -15 when w = 2.5, find m when w = 12.5.

**** IF TIME PERMITS?? 8. If y varies jointly as x and z and y = 10 when z = 4 and x = 5, find y when x = 4 and z = 2.

**** IF TIME PERMITS?? 9. If y varies inversely as x and y = $\frac{1}{4}$ when x = 24, find y when x = $\frac{3}{4}$.

Solve.

10. $\frac{2}{d} + \frac{1}{d - 2} = 1$

11. $\frac{1}{x - 3} + \frac{1}{x + 5} = \frac{x + 1}{x - 3}$

12. $\frac{1}{x - 3} + \frac{2}{x^2 - 9} = \frac{5}{x + 3}$

E. Chapter 10:

1. Sketch the graph of $y = (\frac{1}{4})^x$.

Solve

2. $4^x = 32$

3. $27^x = \frac{1}{3}$

4. $9^{(x-2)} = 81$

Evaluate.

5. $\log_4 128$

6. $\log_{\frac{1}{3}} 27$

7. $\log_{11} \frac{1}{121}$

Solve.

8. $\log_3 t = 5$

9. $\log_x \frac{1}{16} = -4$

10. $\log_{1000} b = \frac{-1}{3}$

Express without using multiplication or division.

11. $\log(5^4 \sqrt{81})$

12. $\log \left(\frac{x^2}{3y} \right)$

Find the given value.

14. $\log 2.71$

15. $\log 4.36$

16. $\log x = 0.6749$

F. Chapter 11:

Find the next 3 terms in each sequence.

1. $-5, -1, 3, 7, \dots$

2. $6, 8, 10, 12, \dots$

3. $a_1 = 5$ and $a_8 = 54$, what is the 4th term of the arithmetic sequence?

4. Find 3 arithmetic means between 8 and 17.

5. Find the seventh term of the geometric sequence: 7, -21, 63, ...

6. In a geometric sequence, $a_1 = 15$, $a_4 = 405$, find r .

7. Find two geometric means between 7 and 56.

8. George took a job for \$18,000 per year with guaranteed \$500 raises every four months. What was his salary at the end of three years?

F. Chapter 11:

9. A cell splits every day, as do the new cells formed. If there are 50 cells initially, how many are there six days later?

Find the sum.

10. $\sum_{k=1}^5 (3k-1)$

11. $\sum_{k=1}^5 \left(\frac{3}{5}k\right)$

12. $\sum_{k=1}^5 3^{k-2}$

13. A contest winner will receive prize money over 16 months. The first month's payment is \$3000, and each succeeding payment will be \$200 more than the preceding one. How much money is the total prize money?

14. -----

Find the sum of each infinite geometric series.

15. $\frac{3}{2} + 1 + \frac{2}{3} \dots$

16. $20 + 4 + \dots$

291 Final Exam Review Answer Key

- A. ① 2 imaginary ② 2 \mathbb{R} , irrational ③ 2 \mathbb{R} , rational ④ $K > \frac{25}{4}$
 ⑤ $x^2 - 6x + 10 = 0$ ⑥ $x^2 + x - 12 = 0$ ⑦ $4x^2 - 12x + 13 = 0$
 ⑧ $x^3 + 3x^2 + 4x + 12 = 0$ ⑨ $16x^2 - 48x^2 + 35x - 6 = 0$ ⑩ $-5 < x < 2$

- B. ① 56 ② $x^4 + 2x^3 + 12x^2 + 24x + 48 + \frac{98}{x-2}$
 ③ $\{3 \pm i, 4\}$ ④ $\{9, -3 \pm 2\sqrt{2}\}$ ⑤ $x^2 - 3, 6, 3$ ⑥ $f'(x) = \frac{x+4}{3}$

- C. ① $(x+3)^2 + (y-4)^2 = 25$ ② $(x-3)^2 + (y-2)^2 = \frac{4}{9}$ ③ $(x-1)^2 + y^2 = 20$
 ④ vertical ⑤ horizontal ⑥ vertical ⑦ $V(-2, -7)$ $F(-2, -6\frac{3}{4})$
 a.o.s $x = -2$ D: $y = -7\frac{1}{4}$ ⑧ $V(\frac{3}{2}, \frac{11}{4})$ $F(\frac{3}{2}, 3)$ a.o.s $x = \frac{3}{2}$ D: $y = 2\frac{1}{2}$
 ⑨ $V(-3, 0)$ $F(-2\frac{3}{4}, 0)$ a.o.s $y = 0$ D: $x = -3\frac{1}{4}$
 ⑩ $C(9, 0)$ $V(9, 7)$ $V(9, -7)$ $F(9\sqrt{53})$ $(0, -\sqrt{53})$ $y = \pm \frac{7}{2}x$
 ⑪ $C(9, 0)$ $V(4, 0)$ $V(-4, 0)$ $F(4\sqrt{2}, 0)$ $F(-4\sqrt{2}, 0)$ $y = \pm x$
 ⑫ $C(9, 0)$ $V(1, 0)$ $V(-1, 0)$ $F(\sqrt{5}, 0)$ $F(-\sqrt{5}, 0)$ $y = \pm 2x$
 ⑬ $\{(8, -6), (-6, 8)\}$ ⑭ $x = -\frac{1}{8}(y+3)^2 + 2$
 ⑮ $\frac{(x-1)^2}{9} + \frac{(y-7)^2}{4} = 1$ ⑯ $\frac{x^2}{9} - \frac{y^2}{16} = 1$

- D. ① $\frac{x-2}{2x+1}$ ② $\frac{x+1}{x+2}$ ③ $\frac{2}{(x+1)(x-1)}$ ④ $\frac{-2}{(x+1)(x-1)^2}$
 ⑤ hole at $x = 4$ ⑥ hole at $x = -7$, V.A. $x = -2$ HA $y = 1$
 ⑦ -75 ⑧ 4 ⑨ 8 ⑩ $\{4, 1\}$
 ⑪ $\{-3, -1\}$ ⑫ $\{5\}$

- E. (2) $x = \frac{5}{2}$ (3) $x = -\frac{1}{3}$ (4) $x = 4$ (5) $\frac{7}{2}$ (6) -3
 (7) -2 (8) $t = 243$ (9) $x = 2$ (10) $b = \frac{1}{10}$
 (11) $\log 5 + \frac{1}{4} \log 81$ (12) $2 \log x - \log 3 - \log y$
 (13) $\log 3 + \frac{7}{5} \log x - \frac{2}{5} \log y$ (14) $.4330$
 (15) $.6395$ (16) 4.73

- F. (1) $11, 15, 19$ (2) $14, 16, 18$ (3) 26
 (4) $10\frac{1}{4}, 12\frac{1}{2}, 14\frac{3}{4}$ (5) 5103 (6) $r = 3$
 (7) $14, 28$ (8) $\$22,500$ (9) 3200 (10) 40
 (11) 9 (12) $40\frac{1}{2}$ (13) $72,000$ (14) $57\frac{1}{2} \text{ in}$
 (15) $9\frac{1}{2}$ (16) 25